Small Business Innovation Research/Small Business Tech Transfer

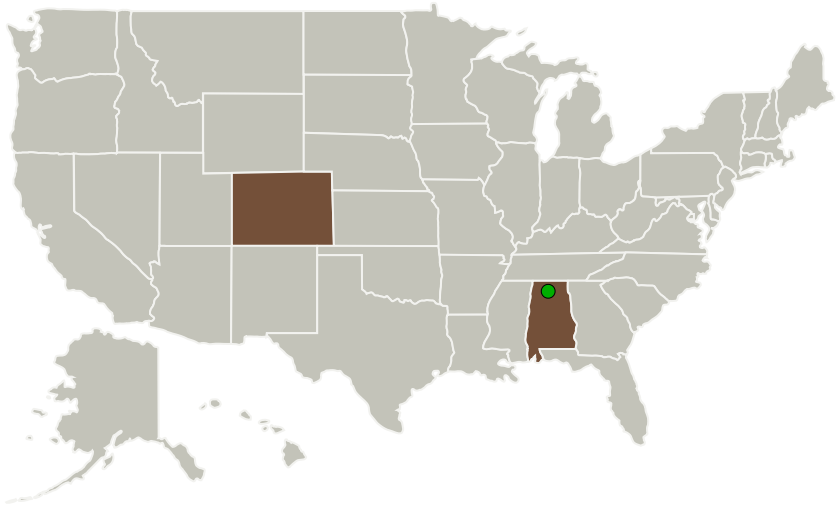
Solar Electric Propulsion CubeSat Bus for Deep Space Missions, Phase I

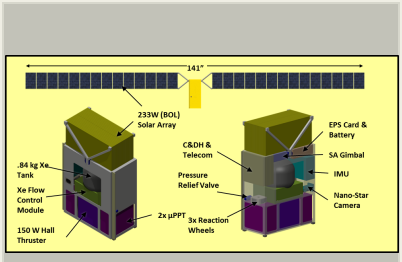
Completed Technology Project (2014 - 2014)

Project Introduction

As electronics continue to shrink in size, the capabilities of CubeSats continues to expand. CubeSats can now perform a wide range of sensing and telecommunications applications. However, CubeSats have been limited in their ability to conduct propulsive maneuvers and to withstand deep space environments. This limits them to the orbits they are deposited in from their rideshare flight. ExoTerra's Solar Electric Propulsion CubeSat Bus opens a whole new set of mission opportunities to CubeSats by providing over 1 km/s of dV for CubeSats through its 6U bus. The bus expands the CubeSat state of the art by implementing 3x higher power solar arrays, high efficiency power distribution and a low power, high efficiency Hall Thruster. To meet deep space mission requirements, we add guidance and navigation systems, incorporate radiation tolerant electronics and integrate thermal control systems into the bus. The SEP CubeSat project demonstrates a first of its kind propulsive capability by building, qualifying and flying the SEP CubeSat. The mission launches from the SLS opportunity in 2017. After Translunar Injection, the Cubesat uses its SEP system to perform lunar orbit insertion and spiral in, becoming the first Cubesat to successfully perform a capture maneuver at another celestial body.

Primary U.S. Work Locations and Key Partners





Solar Electric Propulsion CubeSat Bus for Deep Space Missions Project Image

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Organizations Performing Work	Role	Type	Location
ExoTerra Resource, LLC	Lead Organization	Industry	Littleton, Colorado
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Colorado

Project Transitions

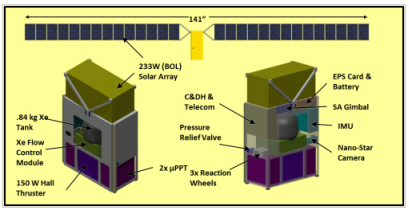
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137418)*

Images



Project Image
Solar Electric Propulsion CubeSat Bus for Deep Space Missions Project Image
(https://techport.nasa.gov/image/126045)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
ExoTerra Resource, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

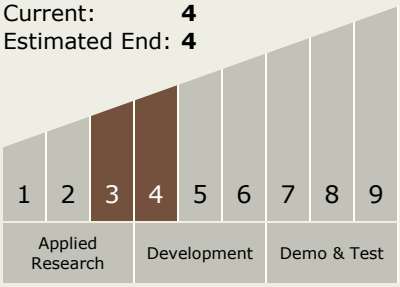
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael Vanwoerkom

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System